

HANDBOOK FOR ARIZONA COMMUNITIES  
On Floodplain Management and the National Flood  
Insurance Program

APPENDIX A

## GLOSSARY

**Alluvial Fan:** Fan-shaped deposits of newly eroded rock and soil, carried out onto the valley floor from mountainsides by landslides, mudslides, mudflows, and more normal runoff (sheet flows, stream flows). Alluvial fans are steeper and narrower at the head of the valley where they consist of boulders and other coarse materials. The fan deposits broaden as they spread out onto the valley--hence the fan shape. An area at the base of a valley where the slope flattens out, allowing the floodwater to decrease in speed and spread out, dropping sediment and rock over a fan-shaped area.

**Approximate Study:** Prepared by approximating mathematical analysis for one or more of the following steps: topographic mapping, hydrologic calculations, and hydraulic calculations, arriving at floodplain delineations without precise water surface profiles. (see "Detailed Study"). Flood mapping that shows the approximate outline of the base floodplain. An approximate study does not produce a base flood elevation.

**Areal:** Pertaining to the land area covered as measured in square miles or other units of area.

**Backwater area:** The low lying lands adjacent to a stream that becomes flooded during periods of high water.

**Backwater Effect:** The rise in water surface elevation caused by an obstruction such as a building, fill material, or bridge that limits the area through which water must flow.

**Base Flood:** The one percent chance (or 100-year) flood adopted by the NFIP as the basis for mapping insurance rating and regulating new construction.

**Base Flood Elevation (BFE):** The regulatory water surface elevation established by FEMA using detailed study methods and reported by the Flood Insurance Study, Flood Boundary Floodway Map, or Flood Insurance Rate Map.

**Basin:** The total land area from which surface run-off is transported away by a drainage system. Also known as a "drainage basin" or "watershed."

**Bed:** The bottom of a channel.

**Bed Slope:** The inclination or gradient of the channel bottom.

**Benchmark:** U.S. Coast and Geodetic Survey (National Geodetic Survey) elevation mark established on some stationary object and used as a vertical reference point in other surveys. Monuments on the ground that show the elevation of the spot above sea level.

**Building:** A walled and roofed structure that is principally above ground. The term includes manufactured homes, mobile homes, and gas or liquid storage tanks. The term is the same as the term “structure” in the federal regulations (44 CFR 59.1).

**Channel:** A natural or man-made waterway that continuously or periodically passes water. The bed of a stream or river. Defined landforms that carry water.

**Channelization:** Improvement of flow characteristics or water carrying capacity of an artificial or natural channel by excavation, bank stabilization, clearing, or other means.

**Channel Capacity:** The maximum flow that can pass through a channel without overflowing the banks.

**CLOMA:** Conditional Letter of Map Amendment. A letter from FEMA conditionally removing a proposed structure or a legally defined parcel of land unaltered by fill from an SFHA (see 44 CFR Ch. 1, Parts 70 and 72).

**CLOMR:** Conditional Letter of Map Revision. A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision (LOMR or Physical Map Revision (PMR)), or proposed hydrology changes (see 44 CFR Ch.1, Parts 60, 65, and 72).

**CLOMR-F:** Conditional Letter of Map Revision based on Fill. A letter from FEMA conditionally removing a proposed structure or a legally defined parcel of land to be elevated by the placement of fill from an SFHA (see 44 CFR Ch.1, Section 65.5 Parts 72).

**Community Rating System:** A program that provides a flood insurance premium rate reduction based on a community’s floodplain management activities.

**Community:** A city, county, township, Indian tribe or authorized tribal organization, Alaska Native village or authorized native organization, or other local government with the statutory authority to enact floodplain regulations and participate in the National Flood Insurance Program.

**Contour:** A line of equal elevation on a topographic (contour) map.

**Contour Interval:** The difference in elevation between adjacent contour lines on a topographic map, usually 1 foot, 2 feet, 5 feet, or some multiple of 10 feet.

**Constriction:** A place or feature that makes the channel and/or floodplain smaller or narrower, thereby reducing its ability to pass flow.

**Critical Depth:** The flow depth at which the inertial forces equal the gravity force. Critical depth is directly related to a Froude Number equal to one. The Froude Number is defined as

$$F = V/(gD)^{1/2}$$

Where      F = Froude Number  
               V = Velocity  
               D = Hydraulic depth= A/T  
               A= Area  
               T = Top width

**Cross Section:** A plot or graph of ground elevation across a stream valley or portion of it, along a line perpendicular to the stream or direction of flow. Surveyed information that describes the stream and the floodplain at a particular point along the stream.

**Cubic Feet Per Second (CFS):** A unit of measurement that describes the volume of flow passing a given point in a stream channel in one second. One cubic foot per second is equivalent to approximately 7.5 gallons per second.

**Current:** The flow of water through a stream channel.

**Datum:** A given, measured, assumed, or otherwise determined point, line, or surface used as a reference in surveying or mapping.

**Detailed Study:** Prepared using mathematical analysis for the following steps, topographic mapping, hydrologic calculations, and hydraulic calculations, to arrive at precise water surface profiles and floodplain delineations. (Refer to "Approximate Study.") Flood mapping that produces base flood elevations, floodways, and other pertinent flood data.

**Detention:** The slowing, dampening or attenuating of flows by temporarily holding (generally less than 72 hours) the water on a surface area, in a storage basin, or within the storm- or combined-sewer itself. All detained water will be returned to the stream after the storm has passed at rates which will not adversely affect downstream occupants and water users.

**Development:** Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

**Discharge:** The volume of water passing through a channel during a given time, usually measured in cubic feet per second.

**Duration:** The time that elapses between when water first flows over a stream's banks until floods are again confined to the stream's banks.

**Ephemeral Stream (or Stream Reach):** A stream (or stream reach) that flows only in direct response to precipitation; measurable discharge generally occurs less than 10 percent of the time. It receives no long-continued supply from melting snow or other surface sources.

Because an ephemeral stream channel is at all times above the water table, it also receives no water from springs or sustained groundwater seepage.

**Erosion:** The removal of soil particles from bed and bank slopes primarily due to water action.

**Field Survey:** The process of measuring dimensional relationships such as horizontal distances, elevations, directions, and angles on the earth's surface for locating property boundaries, construction layout, and map making.

**Fill material:** Soil that is placed at a specified location to bring the ground surface up to a desired elevation.

**Flood or Floodwaters:** A temporary rise in water level, including groundwater, or overflow of water onto lands not normally covered by water.

**Flood Boundary Floodway Map (FBFM):** An official map of a community, on which the Federal Insurance Administration has delineated the regulatory floodway.

**Flood Control:** Confine, limit, or control the runoff characteristics of a watercourse through structural means such as dams and levees.

**Flood Crest:** The elevation or maximum height reached or expected to be reached by the waters of a given flood at a given location.

**Flood Fringe:** The part of the floodplain located outside of the floodway but still subject to flooding.

**Flood Hazard Boundary Maps:** Maps prepared by the Federal Insurance Administration or the Federal Emergency Management Agency showing areas of potential flood hazard as determined through approximate methods.

**Flood Insurance Emergency Phase:** The initial phase of the National Flood Insurance Program when limited amounts of flood insurance are available. Communities use Flood Hazard Boundary Maps to identify flood hazard areas and they also adopt general flood resolutions or measures. See Flood Insurance Regular Phase.

**Flood Insurance Rate Maps:** Maps prepared by the Federal Insurance Administration or the Federal Emergency Management Agency showing areas that have an one percent chance of being flooded in any given year (100-year floodplain) as determined through detailed methods and showing Flood Insurance Rate Zones for determining insurance rates for the National Flood Insurance Program.

**Flood Insurance Regular Phase:** That phase of the National Flood Insurance Program when communities approve their Flood Insurance Study (FIS) and adopt a legally enforceable

floodplain ordinance that meets FEMA criteria. Actuarial insurance rates are used which reflect the degree of risk. Higher limits of coverage both for structures and their contents are available under the regular program. See Flood Insurance Emergency Phase.

**Flood of Record:** The greatest flood recorded for a location.

**Floodplain:** The low lands adjoining the channel of a river, creek, stream, or other water course, lake, or body of standing water which may be or have been covered by floodwaters.

**Floodplain Delineation:** The process of showing in graphic form on a map or photo mosaic areas that may be or have been inundated by a specific or predicted flood.

**Floodplain Insurance Study:** A study prepared using detailed methods to determine water surface profiles and floodplain delineations including delineation of the 100-year floodplain. A report published by FEMA for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM.

**Floodplain Management:** Identify and recognize hazards associated with the runoff characteristics of a watercourse and develop floodplains safely.

**Floodproofing:** Protective measures added to or incorporated in a building that is not elevated above the base flood elevation to prevent or minimize flood damage. "Dry floodproofing" measures are designed to keep water from entering a building. "Wet floodproofing" measures minimize damage to a structure and its contents from water that is allowed into a building.

**Floodway:** The area along a watercourse that must be reserved for the conveyance of floodwaters. The floodway width is estimated using the 100-year peak discharge and appropriate local encroachment criteria. Encroachment means placing fill, structures, developments, or other material within the floodplain limits. An administrative floodway is a floodway delineated by the procedures described in this document as opposed to floodway delineation procedures mandated by the NFIP.

**Freeboard:** A factor of safety usually expressed in feet above a design flood level for flood protection or control works.

**General Condition of Flooding:** As defined by NFIP, means inundation of at least two acres or two separately owned properties which are normally dry land areas. The inundation must be a result of the overflow of inland or tidal waters; the unusual and rapid accumulation or runoff of surface waters from any source; or mudslides that are caused by flood as defined above.

**Hydraulic Analysis:** The study of determining water elevations for particular flood events.

**Hydrologic Analysis:** The study of determining rainfall run-off (floodwaters) for a specific watershed.

**Hydrostatic Pressure:** The pressure put on a structure by the weight of standing water. The deeper the water, the greater the hydrostatic pressure.

**Increased Cost of Compliance:** An additional claim payment made to a flood insurance policy holder to help cover the cost of bringing a substantially damaged or repetitively damaged building into compliance with the NFIP construction standards for new buildings.

**Intermittent Stream (or Stream Reach):** A stream (or stream reach) which has surface discharge generally between 10 and 80 percent of the time. Because an intermittent stream channel is at or near the water-table surface, discharge can be the result of a discontinuous supply from springs or ground water seepage, a discontinuous supply from surface sources, including runoff or rainfall and seasonal snowmelt, or both. If a channel has a sustained period of no stream flow interrupted by a seasonal period of continuous streamflow, at least one month in length, the stream or streams is intermittent.

**Levee:** An artificial barrier constructed to prevent a river or stream from overflowing.

**LOMA:** Letter of Map Amendment. An official letter from FEMA removing an existing structure or a legally defined parcel of land unaltered by fill from an SFHA (see 44 CFR Ch. 1, Part 70).

**LOMR:** Letter of Map Revision. An official letter from FEMA removing an existing structure or a legally defined parcel of land elevated by the placement of fill from an SFHA (see 44 CFR Ch. 1, Section 65.5 and Part 72).

**Mean Sea Level:** The average height of the sea for all stages of the tide over a 19-year period.

**Meandering Stream:** A stream in which broad, semicircular curves have developed as the stream eroded the outer bank of a curve and deposited sediment against the inner bank.

**National Datum:** The vertical and horizontal data that have been defined by the National Geodetic Survey; Mean Sea Level (MSL) for vertical control and state plane coordinates within each state for horizontal control.

**National Geodetic Survey (NGS):** The federal agency within the U.S. Department of Commerce which is responsible for establishing standards for vertical and horizontal data and for establishing surveying criteria. (Formerly the U.S. Coast and Geodetic Survey.)

**Perennial Stream or (Stream Reach):** A stream (or stream reach) which has measurable surface discharge more than 80 percent of the time. Discharge is at times in part or in total

the result of springflow or groundwater seepage because the streambed is lower than surrounding groundwater levels.

**Physical Map Revision (PMR):** A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects large scope changes (see 44 CFR Ch. 1, Parts 60, 65, and 72).

**Post-FIRM Building:** For insurance rating purposes, a post-FIRM building was constructed or substantially improved after December 31, 1974, or after the effective date of the initial Flood Insurance Rate Map of a community, whichever is later. A post-FIRM building is required to meet the National Flood Insurance Program's minimum Regular Program flood protection standards.

**Pre-FIRM Building:** For insurance rating purposes, a pre-FIRM building was constructed or substantially improved on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Map of the community, whichever is later. Most pre-FIRM buildings were constructed without taking the flood hazard into account.

**Probable Maximum Flood (PMF):** Theoretically the greatest flood physically possible in a drainage basin.

**Profile View:** A two-dimensional representation of a stream channel and floodplain that cuts vertically through the center of the channel in the direction of flow (also Side View).

**Rain Gauge:** A gauge for measuring the amount and sometimes, the intensity of rainfall.

**Rating Curve:** An algebraic curve showing the relationship between the volume of water flowing past a given point on a stream and the depth of flow at that point.

**Reach:** A section of a stream's length.

**Reconstruction:** Building a new structure on the old foundation or slab of a structure that was destroyed, damaged, purposefully demolished, or razed. The term also applies when an existing structure is moved to a new site.

**Recreational Vehicle:** A vehicle designed primarily for use as temporary living quarters.

**Regression Curve:** An algebraic curve which correlates a dependent variable with one or more independent variables allowing the prediction of values of the dependent variable based on the observed correlation between past values of the dependent and independent variables.

**Regulatory Flood Elevation (RFE):** the elevation which is one foot above the base flood elevation for a watercourse for which the base flood elevation has been determined.

**Rehabilitation:** An improvement made to an existing structure that does not affect its external dimensions.

**Retention:** The prevention of runoff from entering a stream, storm sewer system, or combined sewer system by storing it in some type of storage basin.

**Recurrence Interval:** The average interval in years within which a given event will be equaled or exceeded; the reciprocal of the probability. For example, the one percent (0.01) chance of flood is the  $1/0.01$  – 100-year flood, and has a 100 year recurrence interval.

**Riprap:** An assemblage of broken stones erected in water or adjacent to water, as on a stream bank, to protect the ground in or near the floodplain from erosion.

**Rise:** An increase in water surface elevations due to increased flow, obstructions to flow, or some combination of those factors.

**Riverine:** Located on or near the banks of a river. Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

**Roughness Coefficient:** A measure of the degree of resistance to water flow offered by a stream channel and the adjacent floodplain, which is a function of vegetation, rocks, channel material, and other such stream characteristics. A measure related to ground surface conditions that reflects changes in floodwater velocity due to ground friction.

**Runoff:** That portion of rainfall or snowmelt that is not absorbed by the soil.

**Scour:** The erosive action of flowing water in streams that removes and carries away material from the bed and banks.

**Sediment:** Soil particles that have been transported away from their natural location by wind or water action.

**Sediment Deposition:** The accumulation of soil particles on the channel bed and banks.

**Sediment Load:** The soil particles transported through a channel by streamflow.

**Special Flood Hazard Area:** The land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed rate making has been completed in preparation for publication of the FIRM, Zone A usually is refined into Zones A, AO, AH, AE, VO, VE, or V.

**Staff Gauge:** A vertical board or rod graduated in increments of a foot to measure stream depths; a rating curve is used to convert the depths to flows in cubic feet per second.

**Stationing:** An arbitrary system for locating a position along a baseline, (reference line) usually a stream centerline, by starting from one end of the baseline and numbering at regular intervals.

**Step-Backwater Method:** A mathematical methodology for calculating a water surface profile over a given stream reach by starting at the downstream end of the reach and, through incremental steps, balancing energy losses at upstream points to arrive at water surface elevations at those points until the entire stream reach has been analyzed.

**Stream gage:** An instrument for measuring the flow of water past a given point on a stream.

**Streamflow:** The movement of water through a channel.

**Subcritical Flow:** That type of flow, for a given discharge of water, where the depth is greater than critical depth and velocities are low.

**Substantial Damage:** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its undamaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

**Substantial Improvement:** Any reconstruction, rehabilitation, addition, or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This definition includes buildings that have been repaired after suffering substantial damage.

**Supercritical Flow:** That type of flow, for a given discharge of water, where the depth is less than critical depth and velocities are high.

**Surface runoff:** That portion of rainfall that moves over the ground toward a lower elevation and does not infiltrate the soil.

**Topographic Mapping:** Mapping which graphically represents the exact physical configuration of a place or region, including elevations, water bodies, and man-made features.

**Variance:** A grant of relief from the requirements of the ordinance, which permits construction in a manner that would otherwise be prohibited by the ordinance.

**Velocity (of water in a stream):** The distance that water can travel in a given direction during an interval of time.

**Vertical Datum:** An elevation used as a reference in surveying or mapping and expressed in feet above Mean Sea Level.

**Watercourse:** A lake, river, creek, stream, wash, arroyo, channel, or other topographic feature on or over which waters flow at least periodically. Watercourse includes specifically designated areas in which substantial flood damage may occur.

**Water Surface Elevation:** The heights, usually in relation to Mean Sea Level, reached by flows of various frequencies and magnitudes at pertinent points in the floodplain.

**Watershed:** An area confined by drainage divides usually having only one streamflow outlet. An area that drains into a lake, stream or other body of water.

**Zone A:** The Special Flood Hazard Area (except coastal V Zones) shown on a community's Flood Insurance Rate Map.

- **A:** SFHA where no base flood elevation is provided.
- **A#:** Numbered A Zones, SFHA where the FIRM shows a base flood elevation in relation to NGVD. (Where # is a number from 1-30.)
- **AE:** SFHA where base flood elevations are provided. AE Zone determinations are now used on new FIRMs instead of A # Zones.
- **AO:** SFHA with sheet flow, ponding, or shallow flooding. Base flood depths (feet above grade) are provided.
- **Zone AH:** Shallow flooding SFHA. Base flood elevations in relation to NGVD are provided.

**Zone B:** Area of moderate flood hazard, usually depicted on Flood Insurance Rate Maps as between the limits of the base and 500-year floods. B Zones are also used to designate base floodplains of little hazard, such as those with average depths of less than 1 foot.

**Zone C:** Area of minimal flood hazard, usually depicted on Flood Insurance Rate Maps as above the 500-year flood level. B and C Zones may have flooding that does not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding and local drainage problems.

**Zone D:** Area of undetermined but possible flood hazards.

**Zone V:** The Special Flood Hazard Area subject to coastal high hazard flooding.

**Zone X:** Newer Flood Insurance Rate Maps show Zones B and C as Zone X.